

What is claimed is:

1. A high power output vacuum electron device comprising:
- a cathode for emitting a supply of electrons,
- an anode for attracting said electrons, said anode being constructed to allow said
- 5 electrons to pass through said anode,
- an RF generator circuit in the path of said electron beam for generating RF signal energy in the presence of a high-voltage power source,
- a magnet surrounding said anode and said RF generation circuit for focusing said electrons into a collimated beam, and
- 10 a collector for receiving the collimated electron beam and for returning the electrons to the cathode, said collector is a multi-stage depressed collector which is shielded from the magnetic field from said magnet.
2. The vacuum electron device of Claim 1 wherein the region of said collector is free of any magnetic fields such that the electron beam naturally disperses to evenly deposit said
- 15 electrons on the inner walls of said collector, said collector being thereby free of hot spots due to uneven electron deposition thereon.
3. The vacuum electron device of Claim 1 wherein said collector is free of magnetic flux reversals from said magnet such that the electron beam evenly disperses on said collector.

4. A vacuum electron device including a source of electrons, said electrons being formed into a narrow beam, and a collector for collecting said electrons, the improvement comprising:

a magnet surrounding and focusing said narrow beam, the magnetic flux of said magnet being parallel to and collinear with the centerline of said electron beam, said magnet having open pole pieces along said centerline to focus and drive said electron beam, said magnet having second open pole pieces adjacent to the area of said source of electrons to initially focus said electron beam, said magnet having no open pole pieces in the vicinity of said collector so that any magnetic flux from the magnet is directed back into the body of said magnet.

5. The vacuum electron device of Claim 4 wherein said collector includes an internal chamber, said electrons evenly dispersing within said internal chamber thereby eliminating any hot spots due to magnetically focused electrons.

6. The vacuum electron device of Claim 5 wherein said collector comprises a multi-stage depressed collector, each of said stages being connected to a different high-voltage supply such that electrons of different kinetic energies will impinge on the associated depressed collector.

7. A gun only magnet utilized in a multi-stage depressed collector high-energy vacuum electron device comprising:

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a first pole piece region generating magnetic flux adjacent a cathode of said vacuum electron device to drive and initially focus electrons emitted from said cathode, and

a second pole piece region forming magnetic flux along the path of electrons to focus said electrons into a narrow beam, said magnet having no pole piece in the region of said vacuum electron device where the electrons are collected and returned to said cathode.

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